

SEQUENCE LISTING

<110> Frohberg, Claus
Koetting, Oliver

Ritte, Gerhard
Steup, Martin

<120> Plants with increased activity of multiple starch phosphorylating enzymes

<130> 65084.000022

<140> Unassigned

<141> 2006-09-01

<150> EP 04090089.6

<151> 2004-03-05

<150> US 60/550,021

<151> 2004-03-05

<150> EP 04090284.3

<151> 2004-07-21

<150> EP 04090121.7

<151> 2004-03-29

<160> 39

<170> PatentIn version 3.1

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Gln Ile Ser Lys Leu Cys Thr Val Leu Leu Lys Ala Val Arg Asn Ser
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Phe Leu Lys Asp Ala Arg Leu Ile Val Arg Ser Ser Ala Asn Val Glu
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Asp Leu Ala Gly Met Ser Ala Ala Gly Leu Tyr Glu Ser Ile Pro Asn
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Ala Gly Val Leu Leu Arg Arg Gly Ala Met Ala Leu Pro Gly Arg Arg
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Gly Phe Ala Cys Arg Gly Arg Ser Ala Ala Ser Ala Ala Glu Arg Thr
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Lys Glu Lys Lys Arg Arg Asp Ser Ser Lys Gln Pro Leu Val His Leu
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Gln Val Cys Leu Glu His Gln Val Lys Phe Gly Glu His Val Gly Ile
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aat act ggc gag gat gct tca gca tct gta act ttt gca cct gaa aaa 627
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Cys Arg Gly Arg Ser Ala Ala Ser Ala Ala Glu Arg Thr Lys Glu Lys
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Lys Arg Arg Asp Ser Ser Lys Gln Pro Leu Val His Leu Gln Val Cys
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Leu Glu His Gln Val Lys Phe Gly Glu His Val Gly Ile Ile Gly Ser
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Thr Asn Gly Trp Val Cys Gln Leu Lys Leu Pro Gly Glu Thr Leu Val
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Glu Phe Lys Phe Val Ile Phe Leu Val Gly Gly Lys Asp Lys Ile Trp
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Asp Ile Val Cys His Trp Asn Arg Thr Glu Glu Pro Leu Glu Leu Leu
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Gly Thr Pro Lys Phe Glu Leu Val Gly Glu Ala Glu Lys Asn Thr Gly
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Glu Asp Ala Ser Ala Ser Val Thr Phe Ala Pro Glu Lys Val Gln Asp
Page 17

195

200

205

Ile Ser Val Val Glu Asn Gly Asp Pro Ala Pro Glu Ala Glu Ser Ser
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Lys Phe Gly Gly Gln Trp Gln Gly Ser Lys Thr Val Phe Met Arg Ser
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 675 680 685

Phe Gln Val Ser Lys Leu Cys Thr Val Leu Gln Lys Ala Ile Arg Glu
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Val Leu Gly Ser Thr Gly Trp Asp Val Leu Val Pro Gly Val Ala His
 Page 19

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965

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975

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Page 29

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200

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Gly Gly Lys Thr Lys Ile His Leu Ala Thr Asp Gly Lys Glu Pro Leu
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450

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His Asn Asn Thr Ser Pro Asp Asp Val Ile Ile Cys Gln Ala Leu Ile

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Ile His Ser	Glu 755	Pro Asn Phe	Arg 760	Arg Asp Gln Lys	Asp 765	Gly Leu Leu
Arg Asp	Leu 770	Gly Asn Tyr	Met 775	Arg Thr Leu Lys	Ala 780	Val His Ser Gly
Ala Asp	Leu 785	Glu Ser	Ala 790	Ile Thr Asn Cys	Leu 795	Gly Tyr Arg Ser Glu 800
Gly Gln Gly	Phe 805	Met Val Gly Val	Gln 810	Ile Asn Pro Ile	Pro 815	Asn Leu
Pro Ser Gly	Phe 820	Pro Glu Leu Leu	Gln 825	Phe Val Ser Glu	His 830	Val Glu
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965

970

975

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Leu Ser Asp Asp Ile Asn Gln Ala Val Ala Glu Lys Leu Gln Ile
 Page 33

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gac Asp	caa Gln 1340	gtc Val	gtg Val	ctc Leu	gat Asp	tac Tyr 1345	aca Thr	aca Thr	gat Asp	cct Pro	ctg Leu 1350	atc Ile	act Thr	gac Asp	4059

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Ser Ala Thr Leu 1135 Arg Leu Val Lys Lys 1140 Gln Phe Gly Gly Cys 1145 Tyr	
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Ala Ile Ser Ala 1150 Asp Glu Phe Thr Ser 1155 Glu Met Val Gly Ala 1160 Lys	
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Ser Arg Asn Ile 1165 Ala Tyr Leu Lys Gly 1170 Lys Val Pro Ser 1175 Ser Val	
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Gly Ile Pro Thr 1180 Ser Val Ala Leu Pro 1185 Phe Gly Val Phe Glu Lys 1190	
gta ctt tca gac gac ata aat cag gga gtg gca aaa gag ttg caa	3722
Val Leu Ser Asp 1195 Asp Ile Asn Gln Gly 1200 Val Ala Lys Glu Leu 1205 Gln	
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Ile Leu Met Lys 1210 Lys Leu Ser Glu Gly 1215 Asp Phe Ser Ala Leu 1220 Gly	
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Val Lys Glu Leu 1240 Lys Glu Lys Met Gln 1245 Gly Ser Gly Met Pro 1250 Trp	
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Pro Gly Asp Glu 1255 Gly Pro Lys Arg Trp 1260 Glu Gln Ala Trp Met 1265 Ala	
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Ile Lys Lys Val 1270 Trp Ala Ser Lys Trp 1275 Asn Glu Arg Ala Tyr 1280 Phe	
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Ser Thr Arg Lys 1285 Val Lys Leu Asp His 1290 Asp Tyr Leu Cys Met 1295 Ala	
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Val Leu Val Gln 1300 Glu Ile Ile Asn Ala 1305 Asp Tyr Ala Phe Val 1310 Ile	
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His Thr Thr Asn 1315 Pro Ser Ser Gly Asp 1320 Asp Ser Glu Ile Tyr 1325 Ala	
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Glu Val Val Arg 1330 Gly Leu Gly Glu Thr 1335 Leu Val Gly Ala Tyr 1340 Pro	
gga cgt gct ttg agt ttt atc tgc aag aaa aag gat ctc aac tct	4172
Gly Arg Ala Leu 1345 Ser Phe Ile Cys Lys 1350 Lys Lys Asp Leu Asn 1355 Ser	

cct caa gtg tta ggt tac cca agc aaa ccg atc ggc ctt ttc ata	4217
Pro Gln Val Leu Gly Tyr Pro Ser Lys Pro Ile Gly Leu Phe Ile	
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Thr Glu Phe Arg Gly Asn Arg Leu Lys Val Gln Lys Lys Lys Ile Pro
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Met Glu Lys Lys Arg Ala Phe Ser Ser Ser Pro His Ala Val Leu Thr
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Thr Asp Thr Ser Ser Glu Leu Ala Glu Lys Phe Ser Leu Gly Gly Asn
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Ile Glu Leu Gln Val Asp Val Arg Pro Pro Thr Ser Gly Asp Val Ser
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Phe Val Asp Phe Gln Val Thr Asn Gly Ser Asp Lys Leu Phe Leu His
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Trp Gly Ala Val Lys Phe Gly Lys Glu Thr Trp Ser Leu Pro Asn Asp
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Arg Pro Asp Gly Thr Lys Val Tyr Lys Asn Lys Ala Leu Arg Thr Pro
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Phe Val Lys Ser Gly Ser Asn Ser Ile Leu Arg Leu Glu Ile Arg Asp
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Thr Ala Ile Glu Ala Ile Glu Phe Leu Ile Tyr Asp Glu Ala His Asp
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Lys Trp Ile Lys Asn Asn Gly Gly Asn Phe Arg Val Lys Leu Ser Arg
 195 200 205

Lys Glu Ile Arg Gly Pro Asp Val Ser Val Pro Glu Glu Leu Val Gln
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Ile Gln Ser Tyr Leu Arg Trp Glu Arg Lys Gly Lys Gln Asn Tyr Pro
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Pro Glu Lys Glu Lys Glu Glu Tyr Glu Ala Ala Arg Thr Val Leu Gln
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Glu Glu Ile Ala Arg Gly Ala Ser Ile Gln Asp Ile Arg Ala Arg Leu
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Thr Lys Thr Asn Asp Lys Ser Gln Ser Lys Glu Glu Pro Leu His Val
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Thr Lys Ser Asp Ile Pro Asp Asp Leu Ala Gln Ala Gln Ala Tyr Ile
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Gly Ile Thr Leu Asp Glu Leu Arg Lys Thr Ile Thr Lys Gly Glu Ile
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Asp Asp Pro Ile Leu Asn Lys Lys Ile Phe Lys Val Asp Asp Gly Glu
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Ser Pro Gly Glu Trp Met Val Pro Pro Ser Ser Ile Leu Pro Pro Gly
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Ser Ile Ile Leu Asp Lys Ala Ala Glu Thr Pro Phe Ser Ala Ser Ser
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Ser Asp Gly Leu Thr Ser Lys Val Gln Ser Leu Asp Ile Val Ile Glu
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Asp Gly Asn Phe Val Gly Met Pro Phe Val Leu Leu Ser Gly Glu Lys
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Trp Ile Lys Asn Gln Gly Ser Asp Phe Tyr Val Gly Phe Ser Ala Ala
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Phe Met His Arg Phe Asn Ile Ala Ala Asp Leu Ile Glu Asp Ala Thr
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Ala Phe Thr Ser His Pro Gln Tyr Arg Glu Ile Leu Arg Met Ile Met
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Met Gln Glu Trp His Gln Lys Leu His Asn Asn Thr Ser Pro Asp Asp
690 695 700

Val Val Ile Cys Gln Ala Leu Ile Asp Tyr Ile Lys Ser Asp Phe Asp
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Leu Gly Val Tyr Trp Lys Thr Leu Asn Glu Asn Gly Ile Thr Lys Glu
725 730 735

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740 745 750

Gly Asp Gln Lys Gly Gly Leu Leu Arg Asp Leu Gly His Tyr Met Arg
755 760 765

Thr Leu Lys Ala Val His Ser Gly Ala Asp Leu Glu Ser Ala Ile Ala
770 775 780

Asn Cys Met Gly Tyr Lys Thr Glu Gly Glu Gly Phe Met Val Gly Val
785 790 795 800

Gln Ile Asn Pro Val Ser Gly Leu Pro Ser Gly Phe Gln Asp Leu Leu
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 850 855 860
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 Ala Asn Pro Glu Lys Ile Met Tyr Phe Ile Ser Leu Val Leu Glu Asn
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1190						1195					1200			
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Thr Ser Gly Ser Leu Ile Leu His Trp Gly Ala Leu Arg Pro Asp Arg	
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Gly Glu Trp Leu Leu Pro Ser Arg Lys Pro Asp Gly Thr Thr Val Tyr	
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Thr Leu Lys Ile Glu Ile Asp Asp Pro Ala Val Gln Ala Ile Glu Phe	
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Leu Ile Phe Asp Glu Ala Arg Asn Asn Trp Tyr Lys Asn Asn Gly Gln	
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Pro Ser Arg Lys Pro Asp Gly Thr Thr Val Tyr Lys Asn Arg Ala Leu
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Arg Thr Pro Phe Ile Lys Ser Gly Asp Asn Ser Thr Leu Lys Ile Glu
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 Glu Tyr Glu Ala Ala Arg Thr Glu Leu Ile Glu Glu Leu Asn Lys Gly
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 Val Ser Leu Glu Lys Leu Arg Ala Lys Leu Thr Lys Thr Pro Glu Ala
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 Thr Asp Ser Asn Ala Pro Ala Ser Glu Ser Thr Val Thr Thr Lys Val
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 Gly Lys Pro Asn Tyr Ala Pro Glu Lys Gln Leu Val Glu Phe Glu Glu
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 Ala Arg Lys Glu Leu Gln Ser Glu Leu Asp Lys Gly Thr Ser Val Glu
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 Lys Gln Leu Lys Asp Lys Lys Tyr Phe Ser Val Glu Arg Ile Gln Arg
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 Lys Lys Arg Asp Ile Val Gln Leu Leu Lys Lys His Lys Pro Thr Val
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 Phe Thr Lys Ser Leu Gln Glu Gln Asp Asn Cys Glu Val Leu Ser Arg
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 Ala Leu Gly Lys Thr Lys Val His Leu Ala Thr Asn Tyr Met Glu Pro
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 Pro Pro Ser Ser Ile Leu Pro Ser Gly Ser Ser Leu Leu Asp Lys Ala
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Asn Asn Asp Cys Lys Gly Gly Met Met Glu Glu Trp His Gln Lys Leu
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 His Asn Asn Thr Ser Pro Asp Asp Val Val Ile Cys Gln Ala Leu Leu
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 Ile His Ser Glu Pro Asn Phe Arg Ser Glu Gln Lys Asp Ser Leu Leu
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Phe Gln Lys Ser Asn Leu Pro Ser Ile Ala Pro Ala Gly His Ala
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20

25

30

Lys Gly Lys Lys Asn Leu Phe Leu Ala Pro Thr Asn Phe Arg Gly Ser
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Arg Leu Cys Val Arg Lys Arg Lys Leu Thr Met Gly Arg His His His
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Arg His Val Asp Ala Val Pro Arg Ala Val Leu Thr Thr Asn Leu Ala
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Ser Glu Leu Ser Gly Lys Phe Asn Leu Asp Gly Asn Ile Glu Leu Gln
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Ile Ala Val Ser Ser Ser Glu Pro Gly Ala Ala Arg Gln Val Asp Phe
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Ala Ile Glu Phe Leu Ile Leu Asp Glu Ala Lys Asn Lys Trp Phe Lys
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 260 265 270

Lys Ala Ala Glu Val Lys Glu Pro Ser Val Ser Glu Thr Lys Thr Ile
 Page 79

275

280

285

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His Tyr Ala Asn Ala Arg Glu Glu Tyr Glu Ser Gly Pro Val Leu Asn
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Lys Thr Ile Tyr Lys Leu Gly Asp Asn Tyr Leu Leu Val Leu Val Thr
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Lys Asp Ala Gly Lys Ile Lys Val His Leu Ala Thr Asp Ser Lys Lys
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Ala Ala Glu Thr Pro Phe Lys Ala Gly Ser Ser Ser His Pro Ser Tyr
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Ile Pro Phe Val Ile Leu Ser Asp Gly Glu Trp Ile Lys Asn Asn Gly
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Ser Asn Phe Tyr Ile Glu Phe Gly Gly Lys Lys Gln Lys Gln Lys Asp
 Page 80

530

535

540

Phe Gly Asn Gly Lys Gly Thr Ala Lys Phe Leu Leu Asn Lys Ile Ala
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Glu Met Glu Ser Glu Ala Gln Lys Ser Phe Met His Arg Phe Asn Ile
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Gln Glu	Leu 835	Gln Pro Ser Leu	Ser 840	Lys Ser Gln Ser	Arg 845	Leu Lys Asp
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Glu Arg Ser Tyr	Glu 865	Glu Leu Asn Asn	Ala 870	Gly 875	Pro Glu Lys Ile	Met 880
Tyr Phe Ile Ser	Leu 885	Val Leu Glu Asn	Leu 890	Ala Leu Ser Ser	Asp 895	Asp
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Met Cys	Lys 915	Ile Lys Asp Thr	His 920	Trp Ala Leu Tyr	Ala 925	Lys Ser Val
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Glu Ile Leu Gln Pro	Ser 945	Ala Glu Tyr Leu	Gly 950	Ser Leu Leu Gly	Val 955	
Asp Lys Trp Ala	Val 960	Glu Ile Phe Thr	Glu 965	Glu Ile Ile Arg	Ala 970	Gly
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Arg Lys Thr	Ala 990	His Leu Gly Ser	Trp 995	Gln Val Ile Ser	Pro 1000	Val Glu
Thr Val	Gly 1005	Tyr Val Glu Val	Val 1010	Asp Glu Leu Leu	Thr 1015	Val Gln
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Glu Ile Ser Leu Glu Val Thr Asn Thr Ser Gly Ser Leu Ile Leu His	
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Trp Gly Ala Leu Arg Pro Asp Lys Arg Asp Trp Ile Leu Pro Ser Arg	
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Phe Val Lys Ser Gly Asp Asn Ser Thr Leu Arg Ile Glu Ile Asp Asp	
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gtt tct tta gag aag ctt cga gct aaa ttg aca aaa gca cct gaa gca Val Ser Leu Glu Lys Leu Arg Ala Lys Leu Thr Lys Ala Pro Glu Ala 265 270 275	991
cct gag tcg gat gaa agt aaa tct tct gca tct cga atg ccc atc ggt Pro Glu Ser Asp Glu Ser Lys Ser Ser Ala Ser Arg Met Pro Ile Gly 280 285 290	1039
aaa ctt cca gag gat ctt gta cag gtg cag gct tat ata agg tgg gag Lys Leu Pro Glu Asp Leu Val Gln Val Gln Ala Tyr Ile Arg Trp Glu 295 300 305 310	1087
caa gcg ggc aag cca aac tat cct cct gag aag caa ctg gta gaa ttt Gln Ala Gly Lys Pro Asn Tyr Pro Pro Glu Lys Gln Leu Val Glu Phe 315 320 325	1135
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att gat cag ttg agg cag aaa att ttg aaa gga aac att gag agt aaa Ile Asp Gln Leu Arg Gln Lys Ile Leu Lys Gly Asn Ile Glu Ser Lys 345 350 355	1231
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cag cgc aaa aag aga gat atc aca caa ctt ctc agt aaa cat aag cat Gln Arg Lys Lys Arg Asp Ile Thr Gln Leu Ser Lys His Lys His 375 380 385 390	1327
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tac tgg gac acc ttg aac aaa aat ggc ata acc aaa gag cgt ctc ttg Tyr Trp Asp Thr 730 Leu Asn Lys Asn Gly Ile Thr Lys Glu Arg Leu Leu 735 740	2383
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gct gtg cat tct ggt gct gat ctt gaa tct gct ata gca agt tgt atg Ala Val His Ser Gly Ala Asp Leu Glu Ser Ala Ile Ala Ser Cys Met 775 780 785 790	2527
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gct Ala	cta Leu 1225	ggt Gly	gaa Glu	ata Ile	aga Arg	aaa Lys 1230	gtc Val	gtc Val	ctt Leu	aat Asn	ctt Leu 1235	act Thr	gct Ala	cct Pro	3871
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gcc Ala	tat Tyr 1345	cct Pro	ggt Gly	cgt Arg	gct Ala	atg Met 1350	agc Ser	ttt Phe	gtt Val	tgc Cys	aaa Lys 1355	aaa Lys	gat Asp	gac Asp	4231
ctt Leu	gac Asp 1360	tct Ser	ccc Pro	aag Lys	tta Leu	ctt Leu 1365	ggt Gly	tac Tyr	cca Pro	agc Ser	aag Lys 1370	cca Pro	att Ile	ggt Gly	4276
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gag Glu	gac Asp 1390	ctg Leu	gaa Glu	ggt Gly	tat Tyr	gct Ala 1395	gga Gly	gca Ala	gga Gly	tta Leu	tat Tyr 1400	gat Asp	agt Ser	gta Val	4366
ccg Pro	atg Met 1405	gat Asp	gag Glu	gag Glu	gat Asp	gag Glu 1410	gtt Val	gta Val	ctt Leu	gat Asp	tat Tyr 1415	aca Thr	act Thr	gac Asp	4411

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Ile Ala Arg Ala Gly His Ala Ile Glu Glu Leu Tyr Gly Ser Pro	
1435 1440 1445	
cag gac gtc gag gga gta gtg aag gat gga aaa atc tat gta gtc	4546
Gln Asp Val Glu Gly Val Val Lys Asp Gly Lys Ile Tyr Val Val	
1450 1455 1460	
cag aca aga cca cag atg tag tatgtatgca tctattagac agctcaataa	4597
Gln Thr Arg Pro Gln Met	
1465	
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35 40 45	
Arg Pro Thr Thr Leu Ser Ala Ser Ser Arg Gly Pro Val Val Pro Arg	
50 55 60	
Ala Val Ala Thr Ser Ala Asp Arg Ala Ser Pro Asp Leu Ile Gly Lys	
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Pro Gln Gly Leu Val Ser Glu Ile Ser Leu Glu Val Thr Asn Thr Ser	

100	105	110
Gly Ser Leu Ile Leu His Trp	Gly Ala Leu Arg Pro Asp Lys Arg Asp	
115	120	125
Trp Ile Leu Pro Ser Arg Lys	Pro Asp Gly Thr Thr Val Tyr Lys Asn	
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Arg Ala Leu Arg Thr Pro Phe Val Lys Ser Gly Asp Asn Ser Thr Leu		
145	150	155
Arg Ile Glu Ile Asp Asp Pro Gly Val His Ala Ile Glu Phe Leu Ile		
165	170	175
Phe Asp Glu Thr Gln Asn Lys Trp Phe Lys Asn Asn Gly Gln Asn Phe		
180	185	190
Gln Val Gln Phe Gln Ser Ser Arg His Gln Gly Thr Gly Ala Ser Gly		
195	200	205
Ala Ser Ser Ser Ala Thr Ser Thr Leu Val Pro Glu Asp Leu Val Gln		
210	215	220
Ile Gln Ala Tyr Leu Arg Trp Glu Arg Arg Gly Lys Gln Ser Tyr Thr		
225	230	235
Pro Glu Gln Glu Lys Glu Glu Tyr Glu Ala Ala Arg Ala Glu Leu Ile		
245	250	255
Glu Glu Val Asn Arg Gly Val Ser Leu Glu Lys Leu Arg Ala Lys Leu		
260	265	270
Thr Lys Ala Pro Glu Ala Pro Glu Ser Asp Glu Ser Lys Ser Ser Ala		
275	280	285
Ser Arg Met Pro Ile Gly Lys Leu Pro Glu Asp Leu Val Gln Val Gln		
290	295	300
Ala Tyr Ile Arg Trp Glu Gln Ala Gly Lys Pro Asn Tyr Pro Pro Glu		
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Lys Gln Leu Val Glu Phe Glu Glu Ala Arg Lys Glu Leu Gln Ala Glu		
325	330	335
Val Asp Lys Gly Ile Ser Ile Asp Gln Leu Arg Gln Lys Ile Leu Lys		
340	345	350
Gly Asn Ile Glu Ser Lys Val Ser Lys Gln Leu Lys Asn Lys Lys Tyr		

355

360

365

Phe Ser Val Glu Arg Ile Gln Arg Lys Lys Arg Asp Ile Thr Gln Leu
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Leu Ser Lys His Lys His Thr Leu Val Glu Asp Lys Val Glu Val Val
 385 390 395 400

Pro Lys Gln Pro Thr Val Leu Asp Leu Phe Thr Lys Ser Leu His Glu
 405 410 415

Lys Asp Gly Cys Glu Val Leu Ser Arg Lys Leu Phe Lys Phe Gly Asp
 420 425 430

Lys Glu Ile Leu Ala Ile Ser Thr Lys Val Gln Asn Lys Thr Glu Val
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His Leu Ala Thr Asn His Thr Asp Pro Leu Ile Leu His Trp Ser Leu
 450 455 460

Ala Lys Asn Ala Gly Glu Trp Lys Ala Pro Ser Pro Asn Ile Leu Pro
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Ser Gly Ser Thr Leu Leu Asp Lys Ala Cys Glu Thr Glu Phe Thr Lys
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Trp Lys Lys Asn Asn Gly Ser Asp Phe Phe Leu Asp Phe Ser Thr His
 530 535 540

Asp Val Arg Asn Ile Lys Leu Lys Gly Asn Gly Asp Ala Gly Lys Gly
 545 550 555 560

Thr Ala Lys Ala Leu Leu Glu Arg Ile Ala Asp Leu Glu Glu Asp Ala
 565 570 575

Gln Arg Ser Leu Met His Arg Phe Asn Ile Ala Ala Asp Leu Ala Asp
 580 585 590

Gln Ala Arg Asp Ala Gly Leu Leu Gly Ile Val Gly Leu Phe Val Trp
 595 600 605

Ile Arg Phe Met Ala Thr Arg Gln Leu Thr Trp Asn Lys Asn Tyr Asn
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610

615

620

Val Lys Pro Arg Glu Ile Ser Lys Ala Gln Asp Arg Phe Thr Asp Asp
 625 630 635 640

Leu Glu Asn Met Tyr Lys Ala Tyr Pro Gln Tyr Arg Glu Ile Leu Arg
 645 650 655

Met Ile Met Ala Ala Val Gly Arg Gly Gly Glu Gly Asp Val Gly Gln
 660 665 670

Arg Ile Arg Asp Glu Ile Leu Val Ile Gln Arg Asn Asn Asp Cys Lys
 675 680 685

Gly Gly Met Met Glu Glu Trp His Gln Lys Leu His Asn Asn Thr Ser
 690 695 700

Pro Asp Asp Val Val Ile Cys Gln Ala Leu Ile Asp Tyr Ile Lys Ser
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Asp Phe Asp Ile Ser Val Tyr Trp Asp Thr Leu Asn Lys Asn Gly Ile
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Thr Lys Glu Arg Leu Leu Ser Tyr Asp Arg Ala Ile His Ser Glu Pro
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Asn Phe Arg Ser Glu Gln Lys Ala Gly Leu Leu Arg Asp Leu Gly Asn
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Tyr Met Arg Ser Leu Lys Ala Val His Ser Gly Ala Asp Leu Glu Ser
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Ala Ile Ala Ser Cys Met Gly Tyr Lys Ser Glu Gly Glu Gly Phe Met
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 820 825 830

Pro Leu Leu Glu Gly Leu Leu Glu Ala Arg Val Glu Leu Arg Pro Leu
 835 840 845

Leu Leu Asp Ser Arg Glu Arg Met Lys Asp Leu Ile Phe Leu Asp Ile
 850 855 860

Ala Leu Asp Ser Thr Phe Arg Thr Ala Ile Glu Arg Ser Tyr Glu Glu
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865		870		875		880
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	885	890	895			
Leu Glu Asn	Leu Ala Leu Ser Ile	Asp Asp Asn Glu Asp	Ile Leu Tyr			
	900	905	910			
Cys Leu Lys	Gly Trp Asn Gln Ala	Leu Glu Met Ala	Lys Gln Lys Asp			
	915	920	925			
Asp Gln Trp Ala	Leu Tyr Ala Lys Ala Phe	Leu Asp Arg Asn Arg	Leu			
	930	935	940			
Ala Leu Ala Ser Lys	Gly Glu Gln Tyr His	Asn Met Met Gln Pro	Ser			
	945	950	955			960
Ala Glu Tyr Leu	Gly Ser Leu Leu Ser	Ile Asp Gln Trp Ala	Val Asn			
	965	970	975			
Ile Phe Thr	Glu Glu Ile Ile Arg	Gly Gly Ser Ala Ala	Thr Leu Ser			
	980	985	990			
Ala Leu	Leu Asn Arg Phe Asp Pro	Val Leu Arg Asn Val	Ala His Leu			
	995	1000	1005			
Gly Ser	Trp Gln Val Ile Ser	Pro Val Glu Val	Ser Gly Tyr Val			
	1010	1015	1020			
Val Val	Val Asp Glu Leu Leu	Ala Val Gln Asn Lys	Ser Tyr Asp			
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Lys Pro	Thr Ile Leu Val Ala	Lys Ser Val Lys Gly	Glu Glu Glu			
	1040	1045	1050			
Ile Pro	Asp Gly Val Val Gly	Val Ile Thr Pro Asp	Met Pro Asp			
	1055	1060	1065			
Val Leu	Ser His Val Ser Val	Arg Ala Arg Asn Ser	Lys Val Leu			
	1070	1075	1080			
Phe Ala	Thr Cys Phe Asp His	Thr Thr Leu Ser Glu	Leu Glu Gly			
	1085	1090	1095			
Tyr Asp	Gln Lys Leu Phe Ser	Phe Lys Pro Thr Ser	Ala Asp Ile			
	1100	1105	1110			
Thr Tyr	Arg Glu Ile Thr Glu	Ser Glu Leu Gln Gln	Ser Ser Ser			

1115	1120	1125
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Ile Pro Phe Gly Thr Phe Glu 1190 1195	Lys Val Leu Ser Asp Gly Leu Asn 1200	
Lys Glu Val Ala Gln Ser Ile 1205 1210	Glu Lys Leu Lys Ile Arg Leu Ala 1215	
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Asn Leu Thr Ala Pro Met Gln 1235 1240	Leu Val Asn Glu Leu Lys Glu Arg 1245	
Met Leu Gly Ser Gly Met Pro 1250 1255	Trp Pro Gly Asp Glu Gly Asp Lys 1260	
Arg Trp Glu Gln Ala Trp Met 1265 1270	Ala Ile Lys Lys Val Trp Ala Ser 1275	
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Asp His Glu Tyr Leu Ser Met 1295 1300	Ala Val Leu Val Gln Glu Val Val 1305	
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Gly Asp Ser Ser Glu Ile Tyr 1325 1330	Ala Glu Val Val Lys Gly Leu Gly 1335	
Glu Thr Leu Val Gly Ala Tyr 1340 1345	Pro Gly Arg Ala Met Ser Phe Val 1350	
Cys Lys Lys Asp Asp Leu Asp	Ser Pro Lys Leu Leu Gly Tyr Pro	

1355

1360

1365

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 1415 1420 1425

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